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P1

US EPA RECORDS CENTER REGION 5



465858

AMERICAN CHEMICAL SERVICE SITE TREATABILITY STUDY WORKSHOP

Presented by:
Focus Environmental, Inc.

Workshop Agenda

- Introductions
- ROD Remedy
- Previous Quantity Estimates
- Pretreatment/Materials Handling Study
- Thermal Desorption Technology Overview
- Thermal Desorption Treatability Study
- Application of Results
- Conclusions

Focus Environmental, Inc.

120 thermal projects completed.

- Established 1988
- 25 Employees (mostly Chemical Engineers)
- Thermal Treatment Consulting Services
 - Process Design and Evaluation
 - Treatability Studies
 - Remedial Design
 - Remedial Action Oversight
 - Performance Testing
- Engineering Services for Thermal Treatment Applications on 50 CERCLA Sites
- EPA START Contractor

William L. Troxler, P.E.

- Principal and VP with Focus Environmental, Inc.
- P.E. - Tennessee, North Carolina, New York
- Engineering Services on 45 Sites Using Thermal Technologies
- Author/Contributor on 8 Thermal Desorption Guidance Documents
- Chairman AEEE Thermal Desorption Committee

Paul A. Sadler

- Consultant with Focus Environmental, Inc.
- Engineering Services on 15 Sites Using Thermal Technologies
- Treatability Testing on 7 CERCLA Sites
- Remedial Design for Thermal Applications on 3 CERCLA Sites
- Focus Project Manager for ACS Site
- Focus Project Manager for Arlington Blending and Packaging Site (45,000 tons of Pesticide-Contaminated Soil)

Focus' Role on ACS Project

- Pretreatment and Material Handling Study
- Thermal Treatability Study
- Thermal Technology Evaluation

Selected Focus Experience

Thermal Treatment Applications

- Times Beach (MO)
- Aberdeen Pesticide Dumps Site (NC)
- Petro Processors (LA) *may be similar to ACS- drums/volatile*
- Arlington Blending (TN)
- Rocky Mountain Arsenal (CO)
- Vertac (AR)
- TH Agriculture & Nutrition (GA)

COMPARISON WITH TYPICAL LTTT SITES

Parameter	Typical Site	ACS Site
Quantity of Soil (tons)	15,000	126,000 - 339,000
Total Organic Content	< 1%	12% (average)
Debris	None	> 35 vol%
Drums	None	~ 50,000
Chlorine Content (mg/kg)	< 200	1,600
Sulfur Content (mg/kg)	None	1,100
Heating Value (Btu/lb)	< 200	~ 1,000

← note the assumption?

Municipal

and you
consider
concentrations

ROD Remedy - “In-Situ” Waste Types

- Buried Drums (Off-site Incineration)
- Miscellaneous Debris (Steam Clean/Offsite Disposal)
- “Buried Waste” (LTTT)
 - PCBs > 10 mg/kg
 - VOCs > 10,000 mg/kg
- “Contaminated Soil” (ISVE or LTTT)
- Metals Contaminated Soil (LTTT, ISVE, Immobilization, Offsite Disposal)
 - Lead > 500 mg/kg
 - Other Metals (antimony, barium, cadmium, chromium)

Pretreatment and Materials Handling Study

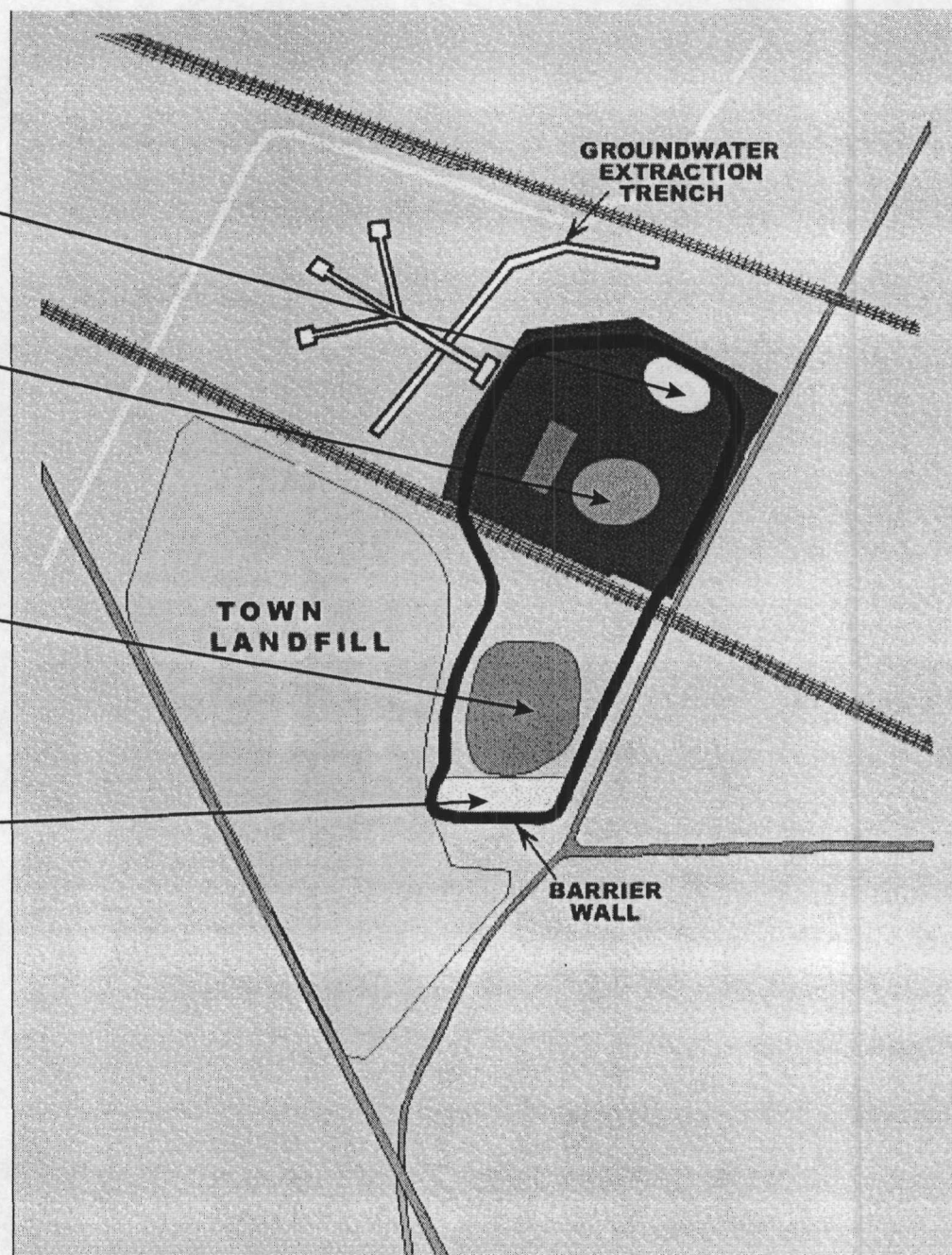
- Determine Extent of Buried Drums in Off-site Area
- Evaluate Type, Quantity, and Screenability of Debris
- Collect Samples for Thermal Treatability Study
- Characterize Representative Samples from Site

- On-Site
Containment Area

- Still Bottoms Area

- Off Site
Containment Area

- Kapica-Pazmey
Drum Recycling



Pretreatment/Materials Handling Study Activities

- Initial Investigations (May, 1997)
- Revised Strategy and Objectives
- Resume Investigations (July, 1997)
- Investigatory Trenches to Locate Drums
- Test Pits for Screening Studies
- Sample Collection (Soils and Liquids)
- Ambient Air Sampling
- Draft Report to EPA (October, 1997)

COMPARISON OF PMHS AND RI RESULTS

Contaminant	MAX	PMHS Median	MAX	RI Median
VOC's (mg/kg)	8660	589	522,000	20,700
SVOC's (mg/kg)	674	61	3,887	243
PCB's (mg/kg)	330	48	250	37
	1990-91	1997	1990-91	1997

POTENTIAL FUGITIVE LOSSES

Analyte	Soil Concentrations		% Removal
	Starting (mg/kg)	Ending (mg/kg)	
Total VOC's	5,242	< 1,431	> 73

Estimated Waste Quantity Comparison

Waste Type	Units	ROD Estimate	Current Quantity Estimates	
			Low Range	High Range
<u>Off-site Disposal</u>				
- Buried Drums	Drums	500	50,000	60,000
- Miscellaneous Debris	yd ³	NS	56,000	80,400
- Metals Contaminated Soil (a)	yd ³	2,500	41,000	49,200
<u>On-site Treatment</u>				
- LTTT	yd ³	19,000	84,000	163,800

NS - Not Specified

Notes:

a) The metals contaminated soil is a subset of the LTTT soils.

Thermal Desorption Implementation

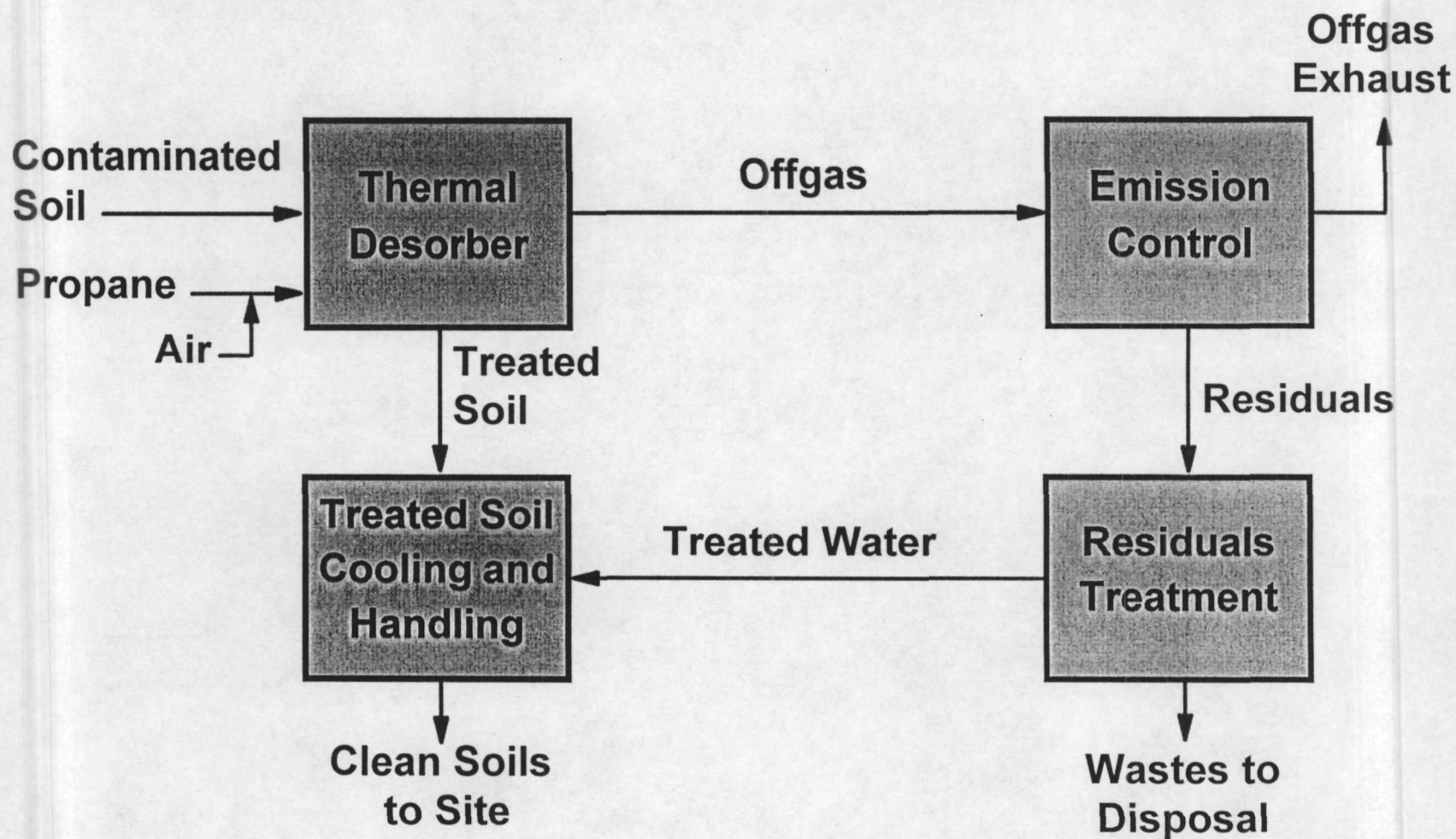
General Issues

- 400 - 800% Increase in Waste Quantity for LTTT over ROD Estimate
- 10,000% Increase in Number of Drums Requiring Off-site Incineration
- 40 - 70% of Materials Require Off-site Disposal
- Potentially High Fugitive VOC Emissions
- Extreme Materials Handling Challenges

Thermal Desorption Technology Overview

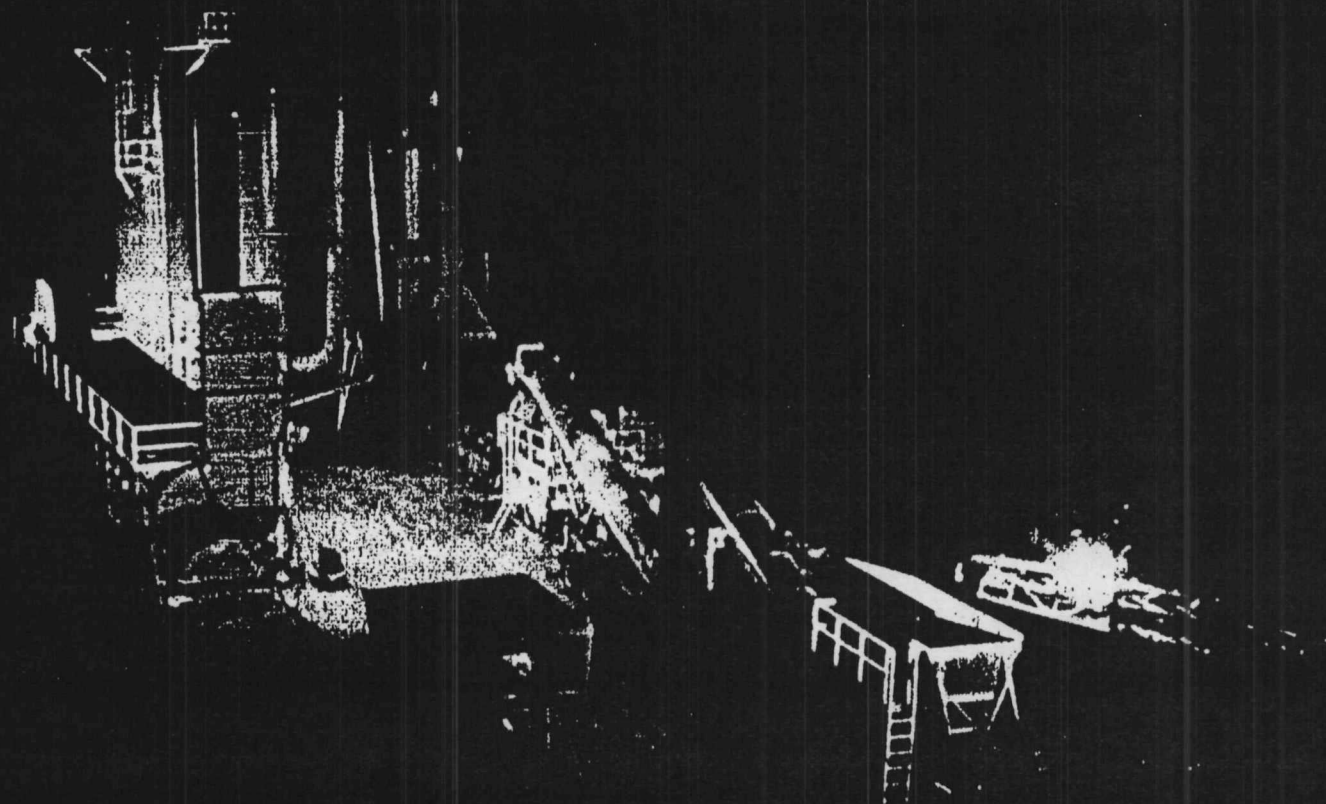
- Definitions
- Types of thermal desorbers
- Types of emission control systems

Thermal Desorption System Diagram

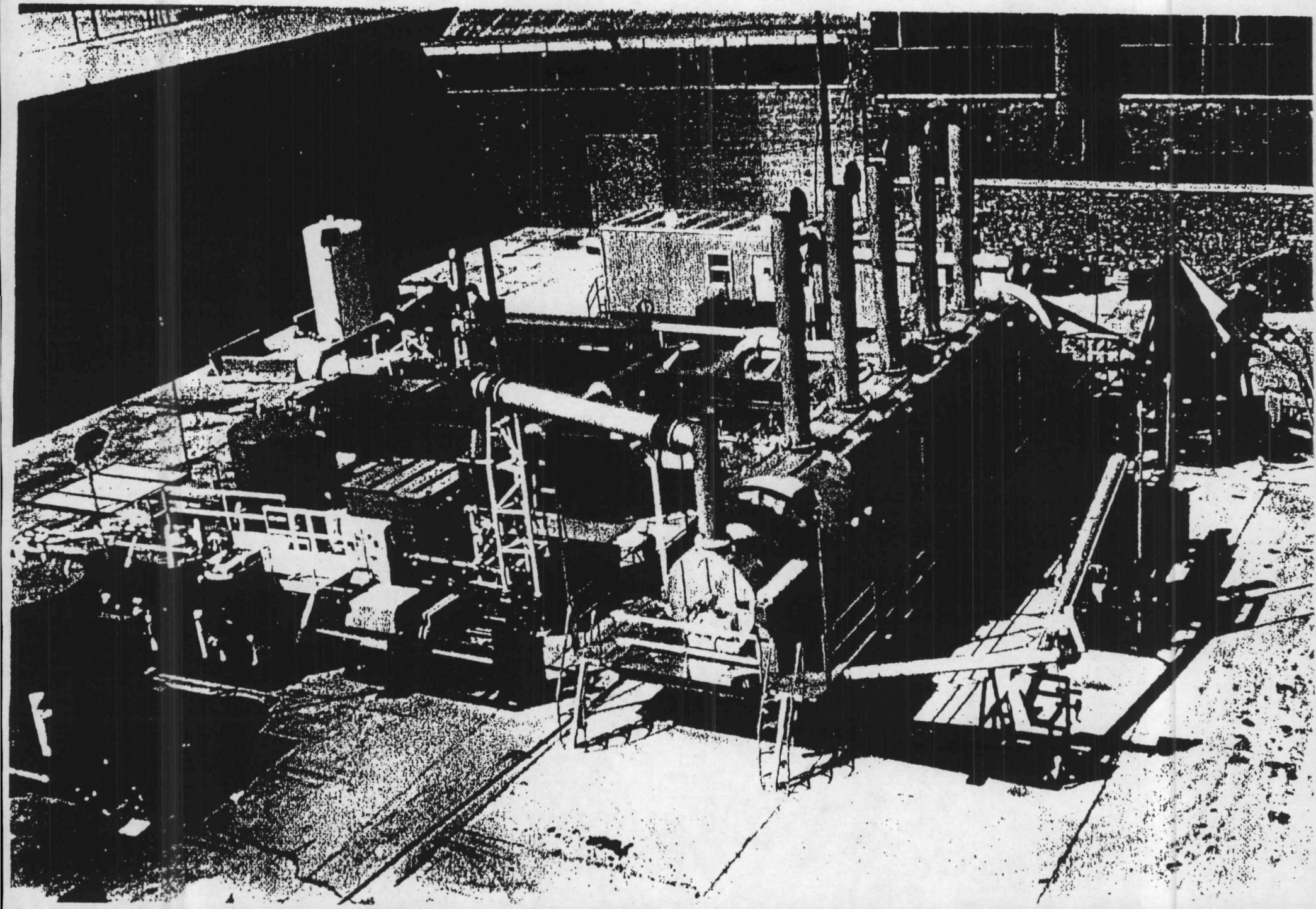


Thermal Desorber Components

- Primary Heating Chamber
 - Directly Heated
 - Indirectly Heated
- Emission Control System
 - Recovery-type
 - Destructive-type



C-LINE #61003
CLEAR TOPPER



Thermal Treatability Study

- Establish Potential Soil Treatment Temperatures
- Characterize Offgas from Thermally Treated Soils
- Estimate Quantity of Process Residuals
- Perform Preliminary Process Safety Evaluation

Thermal Treatability Study

Tiered Approach

- Sample Collection and Characterization
- Tray Testing
 - Small soil quantity (~100 grams)
 - Establish soil treatment temperature requirements
- Rotary Thermal Apparatus Testing
 - Larger soil quantities (~900 grams)
 - Characterize treated soils
 - Characterize offgas from thermally treated soils

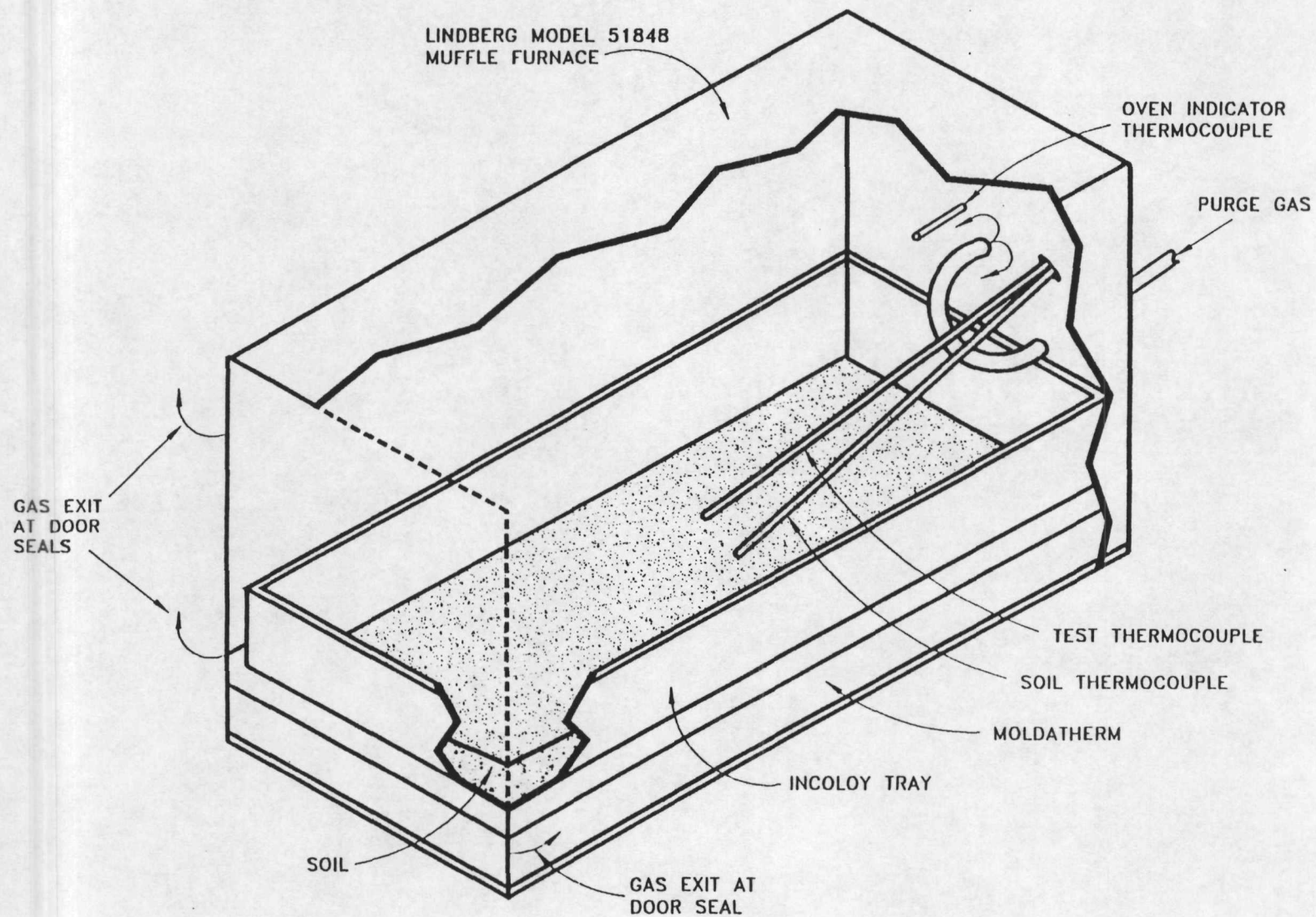
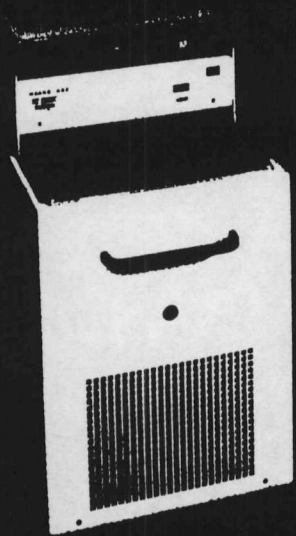


Figure 4-1. Tray Test - General Configuration

Tray Testing Results

- Met Soil Treatment Objectives at 900 F for All Parameters Except CPAHs
- Performance Standard for CPAHs is 1,000 Times Below Analytical Detection Limit



Thermal Desorption Implementation Process Issues

- Very High Carbon Monoxide and Total Hydrocarbon Emissions and Extreme Residual Quantities Eliminates Recovery Systems
- Process Safety Concerns Related to Exceeding Lower Explosive Limits Eliminates Indirect or Directly Heated systems
- High Corrosion Potential From Chlorine and Sulfur
- Fouling of Emission Control System Components

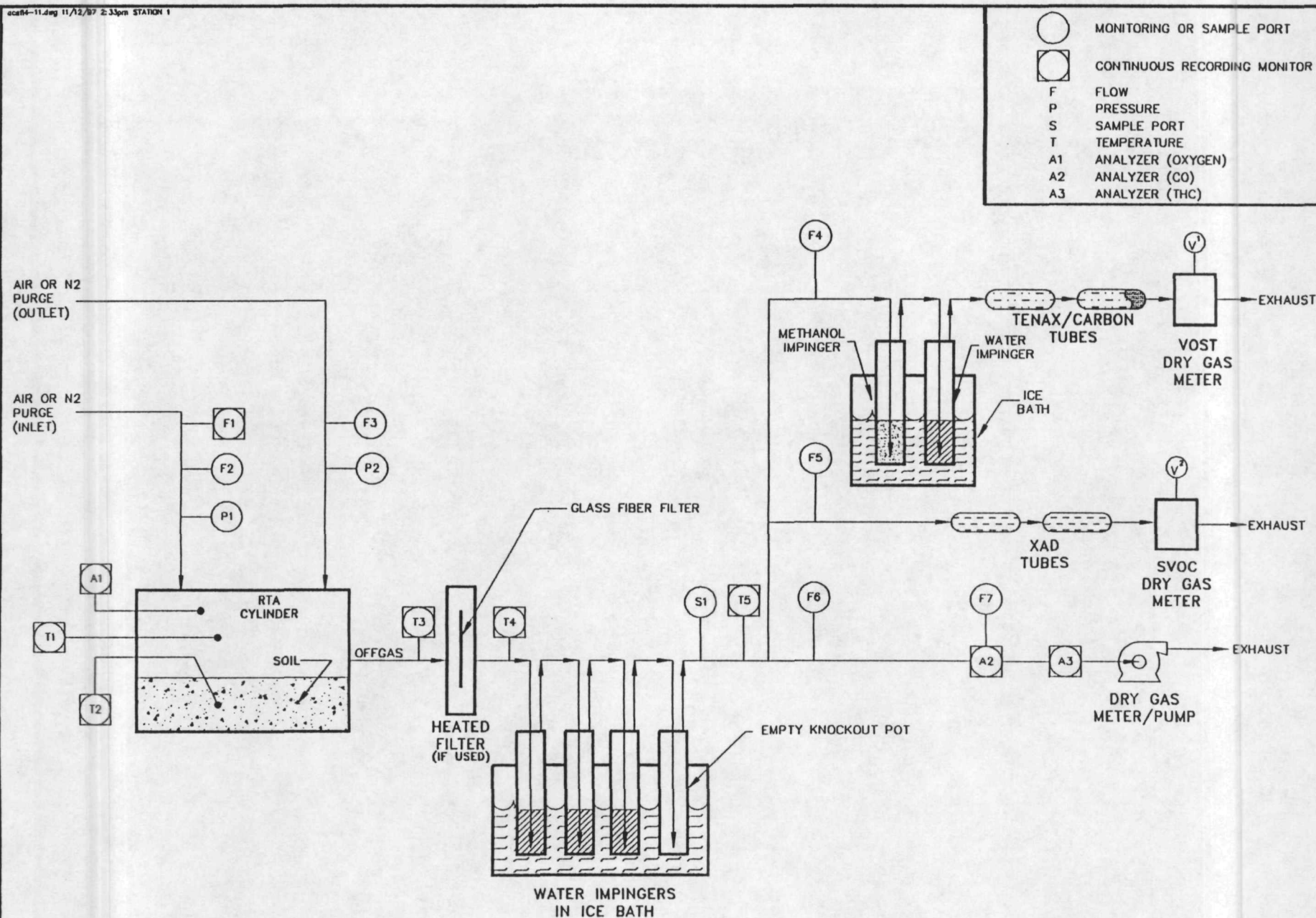
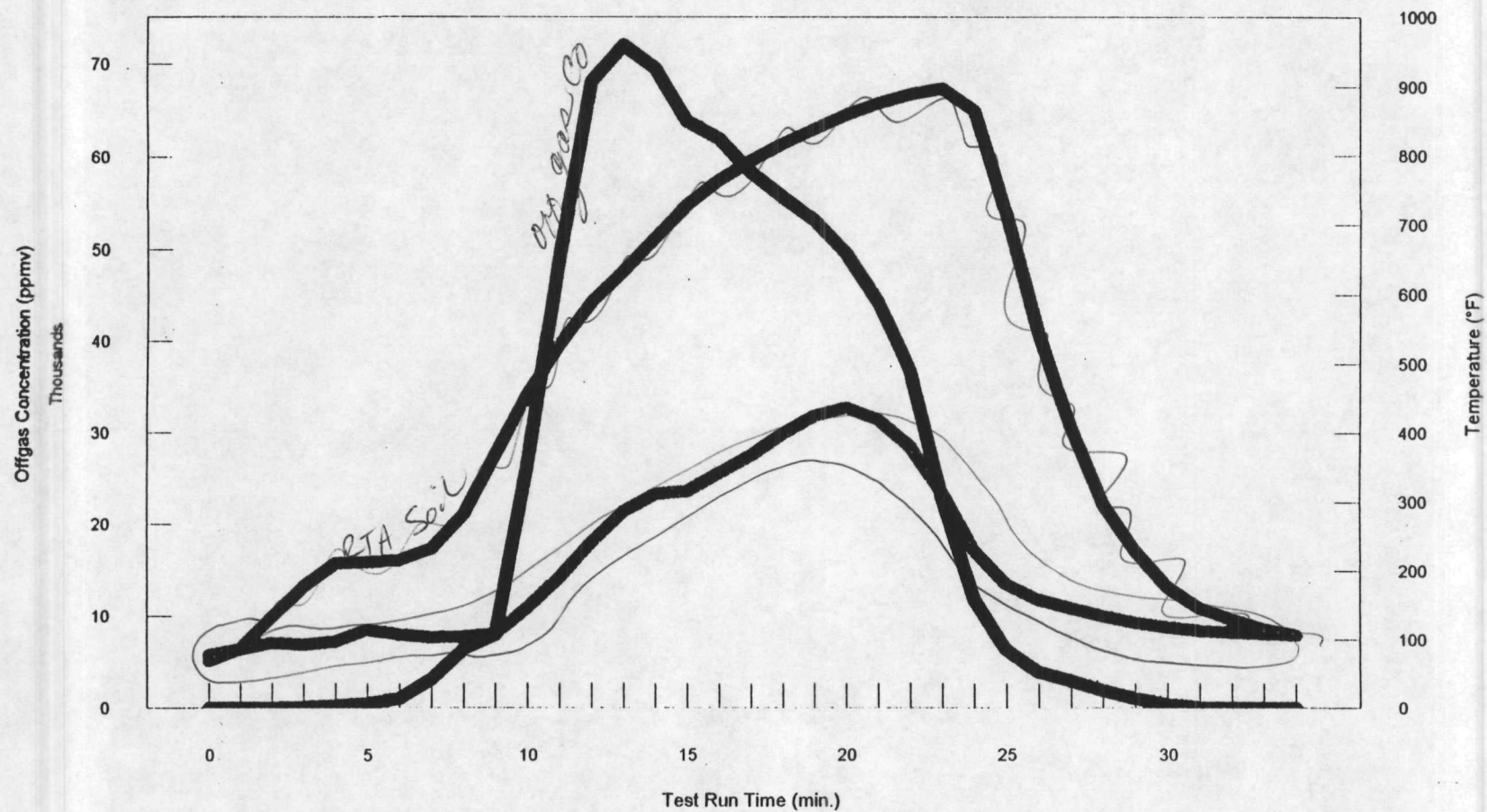


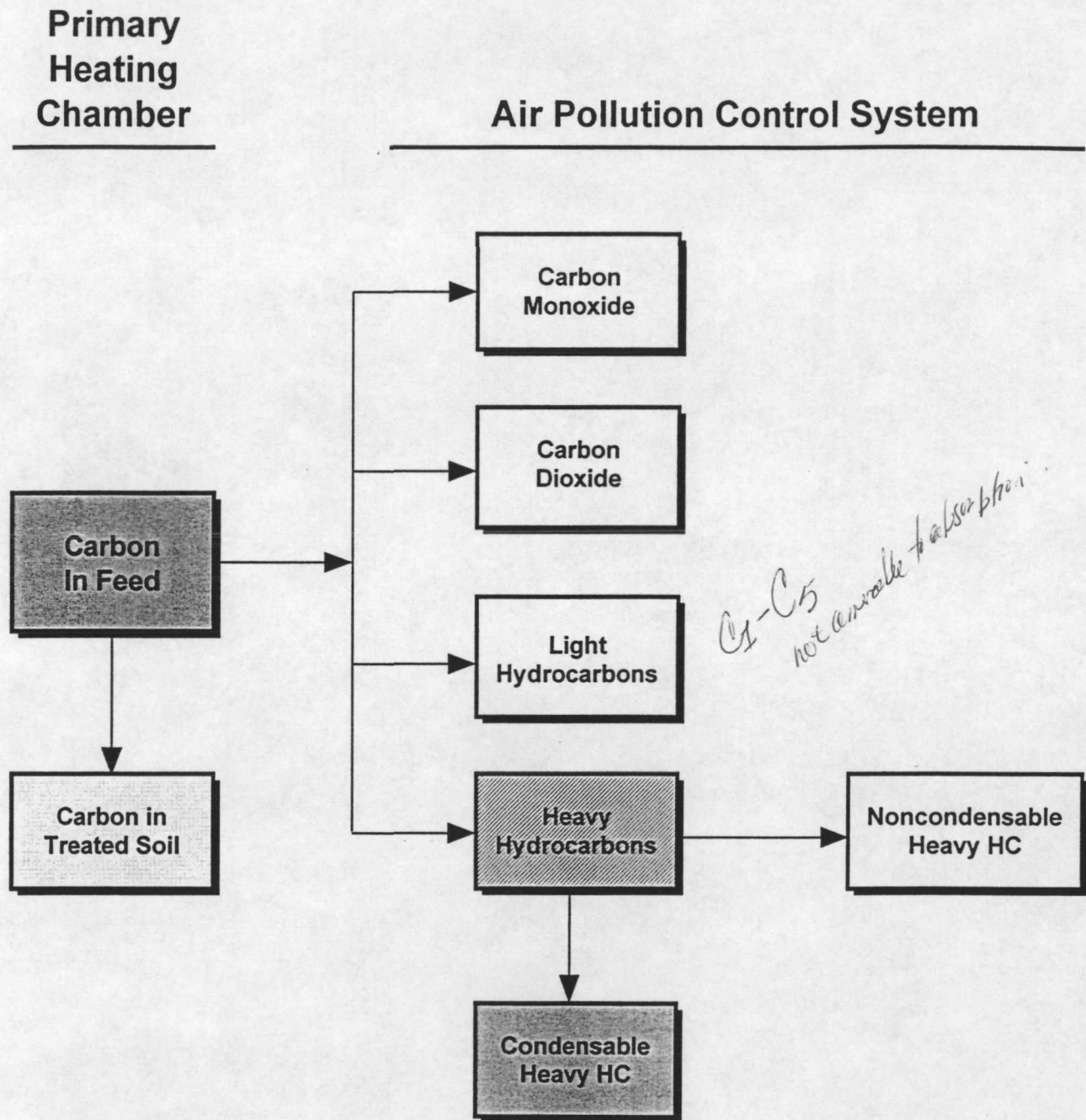
Figure 4-11. General Flow and Monitoring Diagram for RTA Testing

Figure 4-15. RTA Offgas Profile : RTA1
Worst Case Soil, Air Purge, 900°F



RTA Soil Offgas THC Offgas CO

CARBON PARTITIONING



"LOWER EXPLOSIVE LIMIT" CONCENTRATIONS

Parameter	25% of LEL (vol%) ^(2-5%) _{in air}	Desorber Offgas	
		Indirectly Heated (vol%)	Directly Heated (vol%)
Organic Carbon	0.5 - 1.3	5	2.5

COMPARISON WITH TYPICAL LTTT SITES

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Sulfur Content (mg/kg)	None	1,100
Heating Value (Btu/lb)	< 200	~ 1,000
Activated Carbon Utilization (tons)	20 - 40	10,000 - 30,000

could be
incinerated
1/2 vapor
1/2 liquid
could go to
treat
plant
9 gpm

ACS NPL Site RD/RA

American Chemical Service
National Priorities List Site
Remedial Design / Remedial Action



ACS in Griffith, Indiana

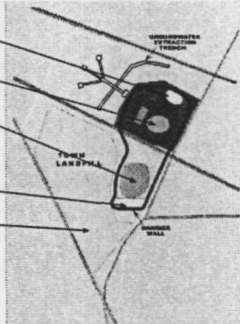


Overview of Site History

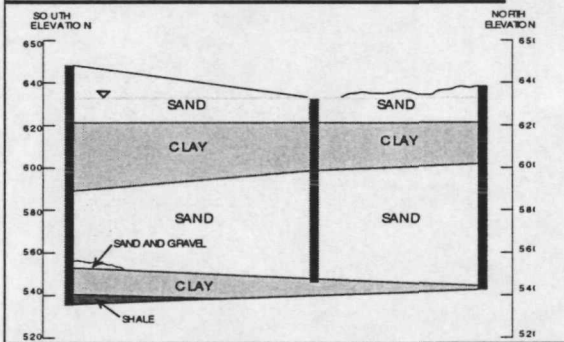
- ◆ Solvent Reclamation Business
- ◆ Investigation & Characterization
- ◆ Record of Decision (ROD)
- ◆ Remediation
 - Current Remedial Steps
 - Final Remediation (Future)

Areas of Buried Waste

- ◆ On-Site Containment Area
- ◆ Still Bottoms Area Facility
- ◆ Off-Site Containment Area
- ◆ Kapica-Pazmey Drum Recycling Area
- ◆ Griffith Town Landfill



Geologic Setting

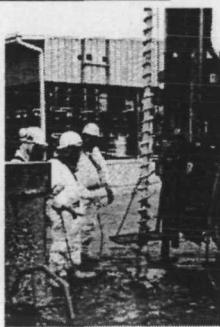


clay 10-30' ⇒

Our records indicate 2' thickness
& fractures.

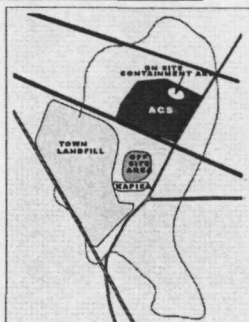
History - Solvent Reclamation

- ◆ 1955 - Began Solvent Distilling Business
- ◆ 1975 - Began Off-Site Disposal of Waste
- ◆ 1987 - ACS placed on the NPL



History - Site Investigation

1991 - Remedial Investigation Defined Character & Extent of Contamination



History -- Changed Approach

1992 Feasibility Study

1. Only Solid & Liquid Waste would be removed -- Everything else would be treated by ISVE -- SVOCs not removed.
2. PCB's greater than 50 ppm would be treated
3. Metal-containing Soil would be fixated & landfilled on-site
4. Miscellaneous Debris would be landfilled off-site
5. Drums taken off-site for disposal

1992 ROD

1. All Waste & Soil to be treated to meet specific clean-up standards for both VOCs & SVOCs.
2. PCB's greater than 10 ppm to be treated to 2 ppm
3. Metal-containing Soil to be fixated and landfilled off-site.
4. Miscellaneous Debris steam-cleaned and landfilled off-site.
5. Drums taken off-site for disposal

History -- RD/RA Work Plan (1995)

Remedial Components

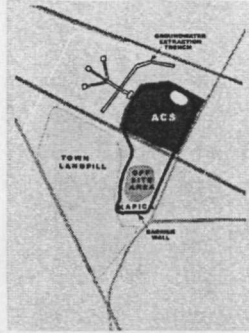
- Low Temperature Thermal Treatment of Buried Waste
- Treatment of Contaminated Groundwater

Pre-Design Investigations

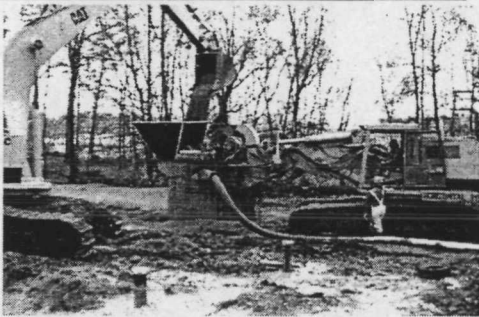
- Evaluate the Treatability of Buried Waste by LTTT
- Refine Delineation of Contaminated Groundwater

Expedited Remedial Steps

- ◆ Construct Perimeter Groundwater Containment System (PGCS)
- ◆ Construct Barrier Wall and Extraction System (BWES)
- ◆ Construct Water Treatment Plant

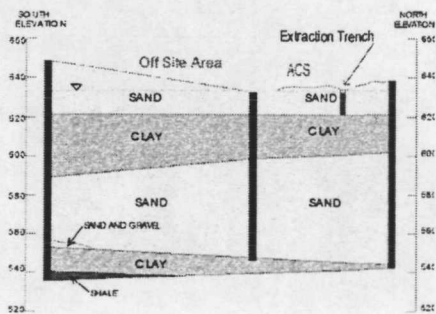


Installing PGCS Extraction Trench

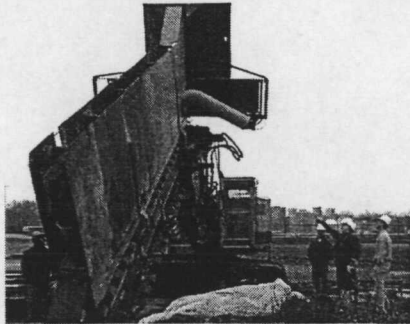


50 gpm = chemical
42 gpm

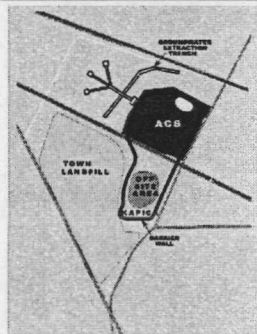
Geologic Setting



Extraction Trench Installer



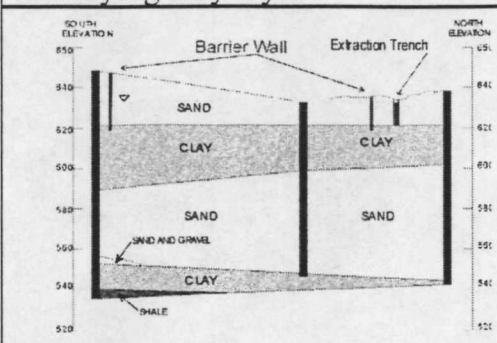
Completed Barrier Wall (with Extraction System)



Installing HDPE and Bentonite Slurry Barrier Wall



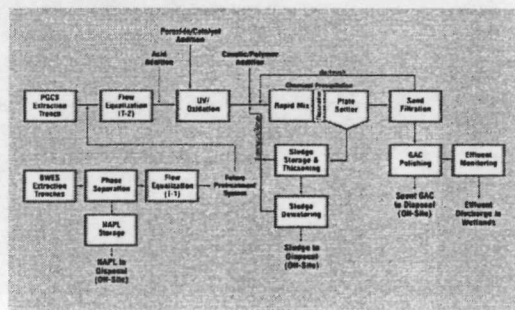
The Barrier Wall is keyed into underlying clay layer



PGCS & BWES Treatment Plant



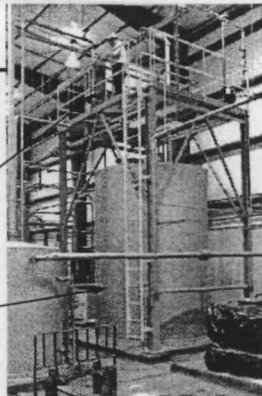
Treatment Plant Process Diagram



Phase Separator

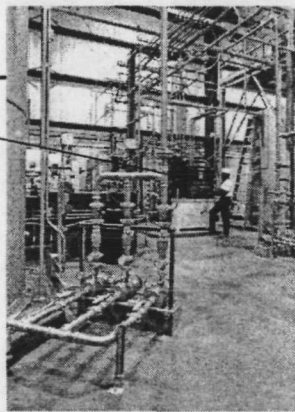
- ◆ Influent water from inside the Barrier Wall passes through the phase separator.

- ◆ Separated liquids are held in lower tank for off-site disposal



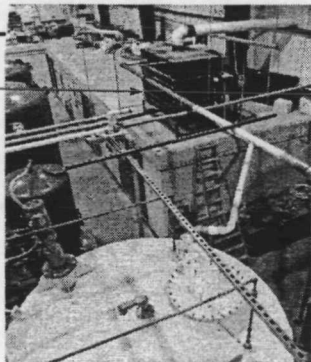
Ultra-violet Oxidation

UV-Ox Unit
Reduces Organic
Compounds to
Carbon Dioxide,
Water, and Salts



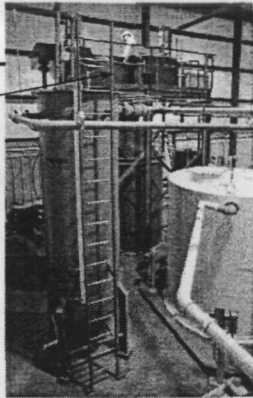
Shallow Tray Air Stripping Unit

- ◆ Air Stripping
Capacity has been
added to the original
design to remove
residual VOCs and
reduce consumption
of GAC



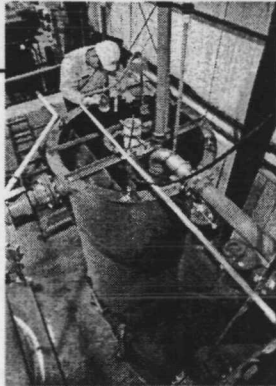
Chemical Precipitation

- ◆ Metals removed with precipitator
- ◆ Fine Particulates are flocculated in clarifier and settled out
- ◆ Sludge is collected in Tank T5, (not in photo) for later pressing and off-site disposal

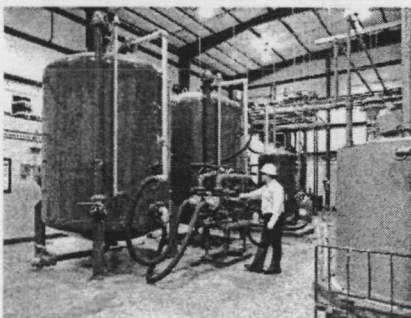


Sand Filter

- ◆ After leaving the clarifier, the water flows in at the bottom of the sand filter, pushing up through the sand, coming out clear at the top.



Granular Activated Carbon Final Polish

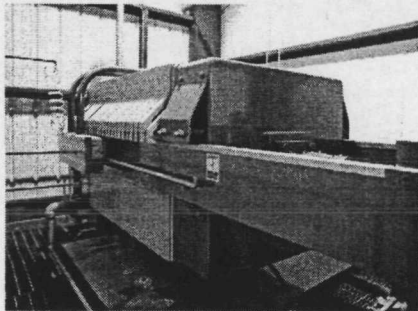


Treated
Water is
Released to
Wetland



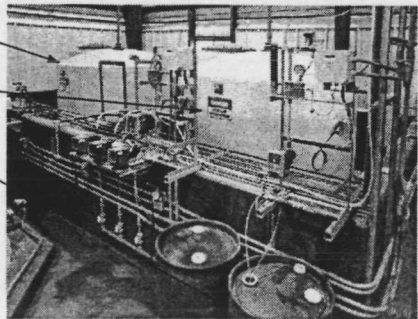
Sludge De-Watering Press for
removed solids

After
pressing,
filter cake
is sent off-
site for
disposal



Acid & Base Buffering Pumps
and Storage

- ◆ Acid
- ◆ Base
- ◆ Enox -
catalyst
for
UV-Ox
Reaction



Computer Monitoring & Control

The Groundwater Treatment System is controlled through custom designed man-machine interface

The system can be controlled directly at this computer, or via modem

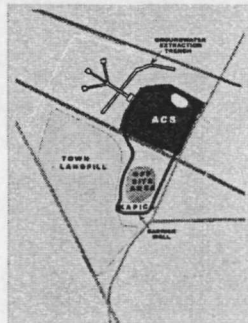


Interim Remediation

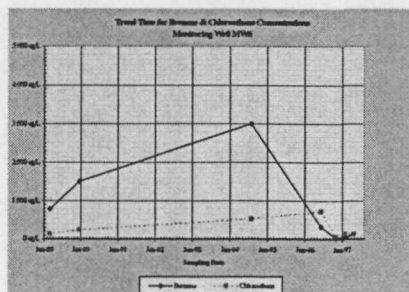
PGCS & BWES

Objective:

Limit Further
Off-Site
Migration of
Contaminants



Trends at MW6



6 months - operating 30-40 gpm.